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RULES OF CONDUCT IN A CONTAMINATED AREA

By V. A. Medvedev

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RULES OF CONDUCT IN A CONTAMINATED AREA

[Following is the complete translation of the book by V. A. Medvedev entitled "Pravila Povedeniya v Zarazhennom Rayone" (English version above), Moscow, 1958, pages 1-48.]

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Introduction

In preparing for war military circles of capitalistic governments are counting on the extensive and unlimited application of mass attack weapons in it: atomic, chemical and bacteriological weapons.

These types of weapons can be used not only at the front lines but also in the rear of the country. Through the use of atomic, chemical and bacteriological weapons the enemy would try to paralyze industry, transportation, communications and interfere with the normal life of the cities.

With the use of atomic weapons possessing a blast effect the contamination of air and territory and objects contained thereon is possible with radioactive substances, aside from the destruction of industrial buildings, houses, transportation facilities, etc.

Contamination of the air, of territory, structures, etc. with war gases and bacterial agents is possible through the use of chemical and bacteriological weapons.

Radioactive agents, war gases and bacterial agents can affect people by entering their bodies in contaminated air, food and water, and by coming into contact with the skin.

In addition, radioactive substances, which emit invisible radiation, can affect people through the external radiation. Radioactive emanations exert a harmful effect from a great distance --hundreds of meters from the contaminated surfaces.

Therefore, a population in the area in which atomic, chemical or bacteriological weapons have been used would be forced to carry on under the complicated conditions of contamination by radioactive agents, war gases and bacterial agents.

The injurious properties of radioactive substances and war gases and bacterial weapons cause people in the contaminated areas to use special defense measures.

The local antiaircraft defense (MPVO) is concerned with matters of protecting the population against enemy attack from the air. Preparation of the population itself is also of great importance.

In order to be able to protect themselves against radioactive agents, war gases and bacterial agents the population should be well acquainted with the injurious properties of these agents, protective facilities and the rules of using them, and should know how to behave in a contaminated area.

Preparation of the population for activities under complicated conditions of atomic, chemical and bacteriological attack has been made the responsibility of the DOSAAF /All-Union Voluntary Society for the Promotion of the Army, Air Force and Navy/, the primary

organizations of which are organizing groups for antiaircraft defense.

In these groups every citizen can learn how to behave under the conditions of atomic, chemical and bacteriological attack, what should be done after leaving the contaminated area, how to perform the initial sanitary processing independently and how to decontaminate protective facilities, clothes, footwear, etc.

This brochure is designed for public instructors training the population in the PVO [antiaircraft defense], as well as for the population being trained in the PVO groups of the DOSAAF.

General Information

Means of Attack from the Air

The principal means of attack from the air against cities, inhabited places and public installations in the rear is military aircraft. Guided rocket and jet missiles (missile aircraft and ballistic rockets) have been designed for these purposes, which may be outfitted not only with the usual explosives but also with charges of nuclear explosives (that is, atom and thermonuclear charges), war gases or military radioactive agents, as well as bacterial agents.

Modern military aviation is equipped with demolition, fragmentation, incendiary, atomic, chemical and bacterial bombs, jet and rocket missiles and other agents.

In the nature of their damaging effects atomic, chemical and bacterial weapons are very much different from demolition, fragmentation bombs and other means of attack from the air. They affect large areas: their radius of action reaches scores of kilometers in a number of cases. In addition, as the result of contamination of the terrain and surrounding objects they can preserve their injurious properties for several hours, days and even weeks.

While demolition and fragmentation bombs produce their damage only at the time of explosion and their effects end with this, radioactive agents and war gases or bacterial agents can produce injuries in masses of unprotected people for a long time.

For these reasons atomic, chemical and bacteriological weapons are frequently called mass attack weapons.

Organization of Defense against Means of Attack from the Air

Protection of the population against the effects of agents of attack from the air has been made the responsibility of the organs of local antiaircraft defense (MPVO), which organize and take a number of special measures beforehand designed both for the prevention and limitation of possible injury and for the direct protection of people and animals at the time of attack from the air.

Among the preventive measures are prophylactic fire-fighting measures the aim of which is the reduction of the danger of conflagration and of the occurrence of fires, particularly when the enemy uses atomic weapons with a blast effect.

Antiepidemic measures, taken on a broad scale in peace time, are directed at the prevention of the possibility of occurrence of

mass infectious diseases among the people, particularly under the conditions of a bacteriological attack.

No less important measures are those such as the protection of water, food products and fodder against the effect of radioactive agents, war gases and bacterial agents, because contaminated water, food products and fodder may be the cause of mass intoxications and disease; besides, they are very hard to decontaminate.

Collective protective facilities--shelter and cover--are prepared beforehand for the direct protection of the population against mass [illegible] weapons in the cities, inhabited places and public installations. [illegible]he large cities special shelters are constructed (of the subway type) which provide reliable protection against all the means of attack from the air.

Most common in the cities and inhabited places are the shelters located in cellars under stone and brick houses, public and other buildings. Sometimes, shelters of equal protective value are made in the form of separate structures. These shelters offer reliable protection against fragmentation and incendiary weapons as well as against the air shock wave, light radiation and penetrating radiation created as the result of an atomic blast. They are outfitted with a filtered air conditioning system designed for purifying air and supplying it to the rooms of the shelter. Construction of the filtered air conditioning system provides reliable purification of the outside contaminated air from war gases, radioactive dust and bacterial agents, used in the form of various recipes sprayed into the air.

Such cover as slit trenches, dugouts, galleries, etc. offer quite reliable protection against the air shock wave, luminous radiation, fragmentation and incendiary weapons, but do not at all protect against contaminated air, because they do not have filtered air conditioning systems and are not hermetically sealed.

Everyone taking cover in such shelter should put on individual protective facilities in the event of an atomic, chemical or bacteriological attack.

Aside from the collective protective facilities the population is provided with individual protective facilities, chiefly gas masks. Industry is making various skin protection facilities for the purpose of protecting the entire body surface. Most reliable of them are the rubberized overalls, suits (jackets and trousers), rubber boots, gloves and others. These skin protection facilities are designed for a prolonged stay in a contaminated locality associated with rescue and other operations; therefore, they are on the supply of special small and large units of the MPVO. By and large, the population will use handy skin protection measures: overcoats, raincoats, cloaks made of rubberized or some other impermeable fabric, rubbers, galoshes, boots and others.

In a number of cases the population can use respirators of various types, used in some Soviet industrial enterprises, as handy measures for protection of the respiratory organs. Protective masks

cotton-gauze dressing can also be used for protection of the respiratory organs; dust goggles, for the protection of the eyes.

The circumstances under which various handy protective measures can be used will be related in the section which follow.

Various MPVO activated units are organized and prepared for the quickest possible elimination of the consequences of an enemy air attack and the recovery of normal life in cities and areas subjected to the attack. They rescue people, give medical aid to the afflicted put out fires, repair damage to water, gas, power and other public utilities, decontaminate the territory of the city, buildings, structures, etc., maintain order in the city territory, and carry out a number of other operations.

A warning system, by means of which all the MPVO signals are transmitted, as well as necessary announcements and orders, has been organized by the MPVO organs for timely warning of the population of the danger of an air attack.

How to Act According to MPVO Signals

The "Threatening State of Affairs" is applied to territory which in the immediate future can be attacked by enemy aircraft by Government decision. This means that all civilians should get and keep individual protective facilities on them at all times, carry out camouflage and fire-prevention measures in their houses, cover up the drinking water and food products with the aim of protectingthem against radioactive agents, war gases and bacterial agents.

The population is also obliged to participate in the preparation of shelters and cover and in taking other MPVO measures.

When the immediate danger arises of an air attack against cities, inhabited places or installations the "Air Alarm" (VT) signal is given.

At the "Air Alarm" signal all civilians should immediately take cover in the nearest shelters.

At the "VT" signal some enterprises stop work, and all those working at them take cover in shelters. However, the majority of enterprises does not stop work, because this cannot be done from the nature of the technological process, for example, at the metallurgical, chemical or other plants. At the "Air Alarm" signal they shift to a special routine of operation established in consideration of the characteristics of the given industry or enterprise. Here, part of the service personnel of these enterprises remains at the work benches for the purpose of carrying out the productive process.

In the event of use of radioactive agents, chemical or bacterial weapons the "Chemical Attack" signal is given. This signal may be local or city-wide depending on the circumstances and the size of the contamination area.

The "Chemical Attack" signal in the contaminated area proper is given by beating on resonant objects--a gong, bell, sections of rails, etc--and is of a local nature, because it is warning of danger to only a small territory. The city-wide "Chemical Attack" signal is given in those cases where a larger territory is contaminated. The city-wide "Chemical Attack" signal is given over the radio broadcasting system, and in the localities it is duplicated by beating on bells, gongs, etc.

In individual cases the boundaries of the contaminated area, the order and routes of exit from it are mentioned over the radio broadcasting system.

The atomic bomb explosion itself is a "Chemical Attack" signal because the radioactive agents formed from the explosion contaminate the territory of the city or inhabited place.

The air alarm all clear signal ("VT All Clear") can be given for an entire city or inhabited place only in case atomic, chemical or bacteriological weapons have not been used for the attack. Otherwise, the "VT All Clear" is given only for the population of those areas which have not been subjected to direct attack.

As a result of the air attack very complicated circumstances may be created in the city. Along with destruction and fire the city territory may be contaminated with radioactive agents and war gases or bacterial agents. This requires discipline from the population and the strict observance of order and established behavior rules.

Those taking cover in shelters should maintain the necessary order and obey all the instructions and orders of the shelter commandant and the MPVO stations. One can leave the shelter only with the commandant's permission; such permission is given, as a rule, after the "VT All Clear" signal has been given and only if the external circumstances permit. If the territory on which the shelter is located is contaminated by war gases and radioactive agents or bacterial weapons, the people are let out of the shelters by permission of the MPVO organs after the decontamination operations of first importance have been carried out.

The people cannot be let out of the shelter either if there is an unexploded bomb near the shelter.

This is the situation with regard to leaving intact shelters. If the shelter has been damaged the situation becomes somewhat complicated.

In the event of occurrence of cracks or damages in the filter air conditioning system war gases, radioactive agents or bacterial agents can enter the rooms of the shelter. If the air intake ducts are destroyed the air influx to the shelter can stop entirely. In the event of damage to the city water supply system or sewage system the shelter may be threatened with flooding. A fire may break out in the building under which the shelter is located or in the shelter itself.

In all these cases further stay in the shelter is dangerous; the people should leave it as soon as possible, even if the "VT All Clear" signal has not been given and the enemy air attack is continuing.

As soon as it is found that air contaminated with radioactive agents or war gases or bacterial agents has entered the shelter or that the air feed has entirely stopped, the gas mask and all the protective facilities should be put on. At the order of the shelter commandant or of the MPVO stations the people leave the shelter through the main exit or use the emergency manholes (Fig. 1.).

Fig. 1. People Leaving Shelter.

In all cases prior to leaving the shelter and entering the territory of the contaminated area all those who have been in the shelter should put on gas masks and protective facilities, carefully checking whether or not there are any exposed portions of the body, listening to the instructions of the commandant on the direction of movement and routes of exit, location of medical and wash stations, etc.

Under the conditions of air attack it is possible that part of the population would be under cover rather than in shelters, while some civilians might not be under cover or in shelters. For example, the service personnel of some enterprises as well as civilians who for various reaons have not managed to take cover at the "Air Alarm" signal.

All those who were under cover or even outside of shelters should, at the "Chemical Attack" signal or on detecting contamination, put on gas masks and all protective facilities and take all measures to leave the area of contamination. The service personnel left at operating enterprises should also put on their protective equipment, but subsequently their actions depend on special instructions and orders of the administration.

Movement in a contaminated locality requires the strict observance of discipline, order and certain precautionary measures. The slightest violation of them can cause not only intoxication or injury but even the death of a person.

In those cases where the MPVO organs have already carried out reconnaissance and designated the boundaries of the area of contamination, people should leave only along designated routes and passages, being guided by MPVO indicators (Figs. 2 and 3). If these have not yet been posted and there are no MPVO stations in the vicinity, one should act independently, without awaiting instructions.

Fig. 2. Warning Signs for Different Types of Contamination

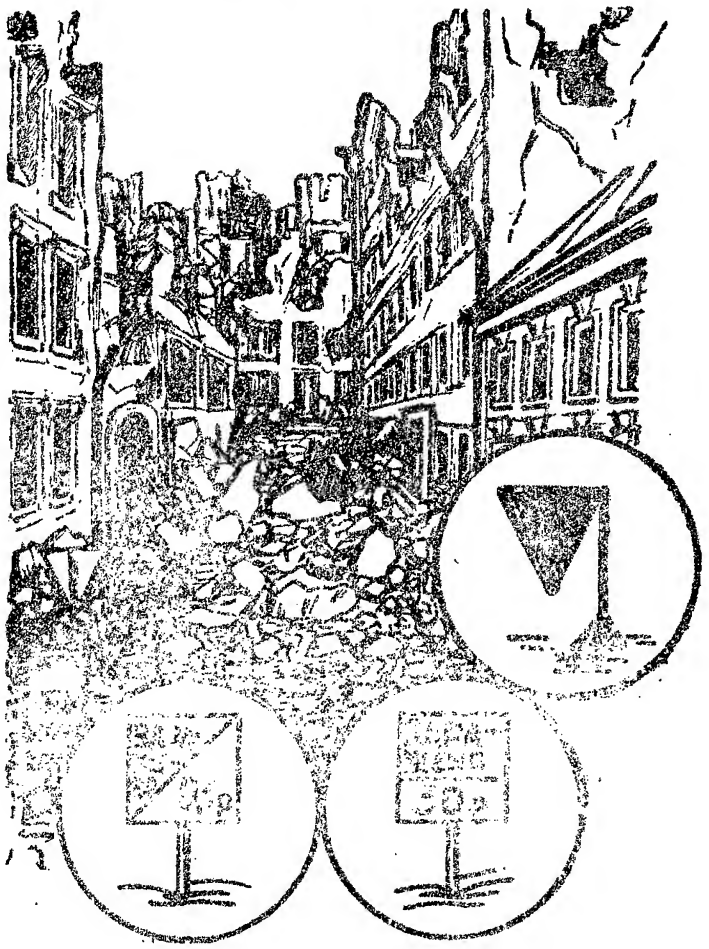

Fig. 3. Warning Signs for Designating Boundaries of Area Contaminated with Radioactive Agents

If one is in a contaminated locality, it should be kept in mind all the time that the air, territory and all the surrounding objects are contaminated. Therefore, even if one is very tired he should not sit down or lean against walls, trees, fences, etc. In no case should he smoke, take food, drink, take off the gas mask,

even if, as a result of the prolonged stay in the gas mask, the person may experience certain inconveniences. Being without a gas mask in contaminated air even for a short time can cause a dangerous or fatal injury.

In moving along streets it is forbidden to enter buildings, take any objects on the contaminated territory or use food products or water suspected of contamination with radioactive or bacterial agents or war gases as food.

If the area has been exposed to the effect of an atomic blast and there has been considerable destruction, one should walk in the middle of the street, watching out for cave-ins.

One should move quickly but should not run, trying to keep from raising dust. If it is necessary to pass through a contaminated area in which there are droplet radioactive or bacterial agents or war gases, or if it is after a rain, one should go around puddles and proceed cautiously so as not to make any splashes. If the routes of exit pass from the contaminated area through parks, boulevards, orchards or other greenery, special caution should be observed; contact with branches and leaves should be avoided, because radioactive, bacterial agents and war gases may settle and be retained on them.

Special caution should be observed in the winter, because radioactive or bacterial agents or war gases can readily be brought into houses or other premises with the snow. In addition, they settle on footwear and clothes with the snow, and after the snow melts they can easily come into contact with the skin and cause intoxication or disease.

If a large group of people is going through a contaminated area they should walk at a certain distance from one another so that the dust from the feet of those in front should not come into contact with the people behind them.

En route, care should be taken continuously that there be no exposed parts of the body, for which purpose the flaps of the mantle, overcoat or raincoat lapels, etc. should be closed tightly. In no case should they be removed or adjusted with the bare hands; gloves and protective socks should not be removed.

Every citizen should give all-possible aid to the aged, invalids, children and those afflicted.

All the precautionary rules and measures listed should be familiar to and carried out by everyone who finds himself on the territory of a contaminated area, regardless of what produced the contamination--radioactive or bacterial agents or war gases.

Since radioactive and bacterial agents and war gases differ from one another in the nature of their injurious effects, methods of detection, duration of action, however, there are naturally some differences also in the behavior and activities of the population in the area of contamination.

Behavior Characteristics in an Area Contaminated by Radioactive Agents

What is Radioactive Contamination?

Radioactive contamination of the air and a locality with all the buildings and structures on it, transportation, equipment and various objects may occur as the result of an atomic explosion as well as from the use of military radioactive agents (BRV).

Before presenting the nature of the radioactive contamination of the locality, we should briefly dwell on what radioactive agents are.

"Radioactive agents" is the name given to those substances which are capable of disintegrating spontaneously, being converted into other substances in the process. During a nuclear transformation the radioactive substances emit invisible radiation. Such disintegration is called radioactive, and the capacity of these substances to emit invisible radiation during their disintegration is called "radioactivity". The time during which the radioactive disintegration occurs differs in the case of all radioactive agents --it varies from fractions of a second to several years and even centuries.

Three types of radioactive emanations are known: alpha-particles, beta-particles and gamma-rays. In their nature they are different, but they all possess the capacity of penetrating into various substances to greater or lesser depths.

Gamma-rays possess the greatest penetrating capacity; like X-rays they can penetrate into wood, earth, metals and others substances to a considerable depth. They are capable of penetrating air for a distance of hundreds of meters. After passing through layers of various substances and materials the gamma-ray flux becomes weaker; the thicker the substance or material through which the gamma-rays pass the more the intensity of them falls off.

Beta-particles also penetrate through layers of various substances or materials, but a much smaller depth. They are retained by window glass and partially by clothes and footwear. In air, beta-particles penetrate to a distance of approximately 20 meters.

Alpha-particles possess an even lesser penetrating power. In air they are capable of penetrating only to a distance of seven cm. A sheet of ordinary paper, clothes and footwear are insurmountable barriers for alpha-particles.

Let us analyze the nature of radioactive contamination of a locality in greater detail in every individual case.

As a result of the atomic explosion radioactive substances are formed which possess the power of emitting alpha- and beta-particles and gamma-rays. In addition, the atomic explosion is accompanied by the formation of a powerful stream of nuclear

particles--neutrons. Initially after the explosion the alpha- and beta-particles do not reach the earth's surface, because they possess little penetrating power even in air. The stream of radioactive emanations which reaches the earth's surface consists of gamma-rays and neutrons, which possess considerable penetrating power. This flux is one of the injurious factors of the atomic explosion; it is called "penetrating radiation".

In addition to their high degree of penetrating power neutrons possess the capacity of reacting with nuclei of the atoms of some chemical substances included in soil, water, structures, etc., as a result of which these atoms acquire active properties, that is, the ability of emitting radioactive emanations.

Under the influence of neutrons sodium, silicon, phosphorus, calcium, iron, copper and other substances acquire radioactivity. Some of them preserve their radioactive properties for a long time. The nature of the radiation of artificial radioactive agents is constituted by beta-particles and gamma-rays.

Radioactive contamination of a locality from penetrating radiation as the result of artificially created radioactive agents is observed over a comparatively small area, however, chiefly directly in the region of the atomic blast, and does not account for the nature or boundaries of the area of contamination.

The atomic blast is accompanied by the formation of a large number of radioactive substances, which consist of nuclear disintegration products of the bomb charge as well as of radioactive débris of the portion of the bomb charge which has not reacted. A certain portion of the radioactive substance is created from the elements of which the bomb is constructed. Thus, for example, if the casing is made of cobalt, the cobalt is made radioactive under the influence of the neutrons, thereby increasing the quantity of radioactive substance formed from the explosion.

First, the radioactive agents are contained in the luminous portion of the atomic explosion, and then part of them settles to earth in the area of the blast, while part is raised along with the heated air.

The degree of contamination of a locality from an atomic blast depends primarily on where the explosion was produced: in the air, at the earth's surface, under the ground or under water, as well as on the charge of the bomb, meteorological conditions (that is, on the weather), the relief and nature of the terrain and soil, etc.

After an air blast the radioactive particles are raised to great heights (10-20 kilometers) along with the atomic blast cloud; then, this cloud is carried away by the wind; the radioactive particles settling out to the ground along the route of its movement leave a contaminated belt on the locality.

The degree of radioactive contamination of a locality after an air blast is slight, because the cloud containing the radioactive

substances is scattered by the wind, and the radioactive particles fall out of it gradually, over a large area. In the area of the blast the contamination is increased through the formation of artificial radioactive substances in the soil, construction material, etc.

A ground blast is characterized by considerable contamination of the locality. This is explained by the fact that with a ground blast the luminous area touches the earth's surface and the incandescent radioactive substances mix with the upper layer of soil and remain in it. Part of the radioactive substance is raised along with the atomic cloud. With the ascent of the cloud the radioactive particles settle to the earth on the dust raised by the explosion. The largest dust particles together with the radioactive substances which have settled on them fall out of the cloud, contaminating the locality in the area of the explosion. The major portion of the radioactive substance is in the air in a finely dispersed state and will fall out of the cloud gradually, along the route of its movement, contaminating the locality beyond the limits of the blast area.

The area of contamination after a ground blast has the shape of an irregular circle, elongated in the direction of the wind. On the leeward side of this area there is a belt contaminated with radioactive substance which has fallen out of the atomic cloud along the "track" of its movement, just as after an air blast. The greatest contamination is observed in the center of the blast area. With the increase in the distance from the center to the edges the degree of contamination decreases (Fig. 4).

Fig. 4. Area of Contamination from a Ground Blast and Belt of Contamination with Radioactive Substances and Dust Settling out of the Atomic Cloud.

Meteorological conditions also exert an influence on the degree of contamination of the locality. In calm windless weather or in a mild wind the cloud in which the radioactive substances and dust are located is scattered slowly by the wind; in a strong wind the area of contamination will be larger. In this case the cloud can be carried away from the site of the blast to a great distance, and the fallout of radioactive substances and dust will occur over a large area, and, therefore, the degree of contamination will be less.

If the fallout of radioactive substances and dust from the cloud occurs during a rain or snow the degree of contamination of the locality increases at first, because the drops of rain or flakes of snow carry radioactive substances to earth. However, afterwards, after a prolonged rain the active agents and dust are washed out and washed away from the contaminated surface, while the fallen snow covers the contaminated surface with a "protective" layer, as a result of which the effect of the radioactive substances is lessened.

Military radioactive substances (BRV) are designed for contamination of the locality and the air. The BRV consists of chemical agents or mixtures containing radioactive substances. They can be used in the solid or liquid state. Aircraft bombs are charged with military radioactive agents, chiefly with a long-distance effect. Such a bomb explodes a certain distance above the earth, and the radioactive agents settle on the locality in the form of "sand" or drops, contaminating it. The finely fractionated solid and liquid BRV particles are mixed with air and contaminate it, forming smokes and fogs.

The characteristic feature of the radioactive contamination is the difficulty of detection if it, because all radioactive agents (those settling to earth from an atomic blast and those which come from the use of BRV) are without any external characteristics (color, odor, etc.). They can be detected only by means of special dosimetric instruments.

Why are Radioactive Agents Dangerous?

Radioactive emanations, as has been stated above, possess the power of penetrating into various substances or materials to different depths. In passing through a layer of any substance, radioactive emanations produce changes in the atoms and molecules of which these substances consist, as a result of which their chemical and physical properties are changed. Such changes occur in the human body under the influence of radioactive emanations.

Radioactive emanations disturb normal cell activity and can cause their death as the result of the effect on molecules of the substances of which the cells are made. Despite the fact that the human body has the power of creating new cells in place of those which die, when a large number of cells are affected the body cannot replace them. As a result, sickness may occur the severity of which

depends on the number of cells affected; in serious cases the sickness may terminate in the death of the person.

Therefore, the injurious effect of radioactive substances is based on the fact that invisible radiation exerts a harmful biological effect on the body.

Radioactive substances can act on the human body by means of internal and external irradiation.

Radioactive substances penetrate into the human body through the inhalation of contaminated air, the use of contaminated food or water, the contact of radioactive substances with wounds or injured skin areas. After entering the body the radioactive substances deposit in certain organs (bones, liver, lungs and others) and subject the body to prolonged internal irradiation.

A person who is in a contaminated area, is constantly subjected to external irradiation by radioactive emanations arising from the disintegration of radioactive substances. In this case, gamma-rays are particularly dangerous, because they possess considerable penetrating power.

Both in the case of internal and external irradiation man does not feel any painful sensations and therefore cannot even suspect the danger. As a result of the irradiation (internal or external) a person may become sick with radiation sickness, signs of which do not appear immediately after the contact but a certain time later. In individual cases, radiation sickness causes the person's death.

The more time a person is in a contaminated locality and the more this locality is contaminated the greater the radioactive emanation effect to which he is exposed and the more severe the course of radiation sickness, because in this case a large number of living cells of the body is affected.

Protective Facilities against Radioactive Agents

For the purpose of protecting the respiratory organs and also in order to protect the entrance of radioactive substances into the body gas masks are used. In the absence of them other agents may be used, for example, respirators or else handy measures, for example, cotton-gauze dressing, pieces of any fabric folded into several layers, a towel, etc.

In order not to give entrance to radioactive substances on the skin, clothes, footwear, and in order also to lessen the effect of external radioactive irradiation, skin protective measures are used, chiefly handy ones.

What can the population use as handy skin protection facilities? Stockings and sleeves made of thick cotton fabric, mantles with hoods are good protection for the entire body surface, the clothes and footwear against contact with radioactive substances and dust. These protective facilities are readily sewn together. It is recommended that white fabric or fabric with light shades be used for this

purpose, because in this case it will serve as protection also against the luminous radiation of the atomic blast. The cloak should come down below the knees. The stockings are put on over the ordinary footwear; they are fastened with string (Fig.5) so that they do not slip down while walking. Any thick gloves can be used in place of sleeves.

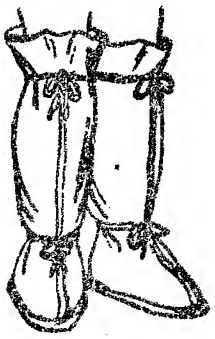

Fig. 5. Protective Stockings Worn over Ordinary Footwear.

If no such suit is available, an impermeable overcoat, raincoat, cloaks or ordinary outside clothing should be used. If they do not have hoods the head should be covered with some kind of kerchief, a cap with ear-muffs, a piece of dense fabric, so that the radioactive agents do not enter the mouth, come in contact with the neck, into the ears or onto the hair.

The feet should be protected particularly carefully, because the largest quantity of dust settles on the feet in walking in a contaminated territory. Leather and rubber boots, high-shoes or rubbers may be used for protecting the feet. The trousers should be tied at the bottom with string (Fig. 6) so that no dust enter under the trouser legs. It is recommended that women wear ski pants or athletic /riding/ breeches or wide trousers. In an extreme case the feet can be wound around with pieces of fabric, burlap or thick fabric.

Rules of Movement in the Contaminated Area and of Exit From It

All the individual protection facilities analyzed protect the organs of respiration, the skin, clothes, footwear from contact with radioactive substances and dust. They partly also protect against external irradiation, because they hold back the alpha-particles and approximately 30 percent of the beta-particles. However, all these facilities do not at all protect against external irradiation with gamma-rays because of their great penetrating power. As has been seen, it is impossible to find any individual protective facilities against gamma-rays. The only means of protection against

them is reducing the time spent on the territory of the contaminated area.

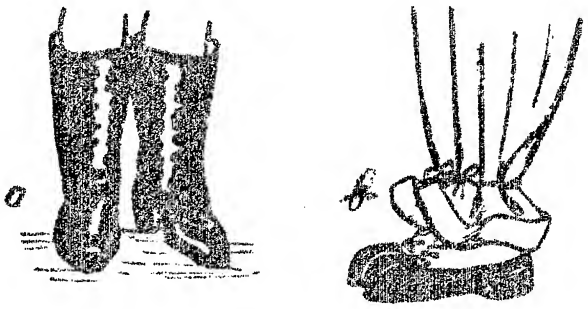

Fig. 6. Handy Measures for Protecting the Feet:

a--rubber boots;
b--rubbers

The population on contaminated territory should leave the contaminated area as soon as possible. This does not mean they should run, creating a panic, because a person can be in contaminated territory for a certain time without any particular harm to himself, particularly when the degree of contamination is slight. However, in all cases come what may a person should shorten the time he is in the contaminated area.

In order correctly to appraise the danger of being in a contaminated area another characteristic of radioactive contamination should be noted. As has been mentioned, radioactive emenations arise from the disintegration of radioactive substances. In an atomic blast various radioactive agents are formed. Some of them disintegrate very slowly; others, very quickly. It has been determined that the greatest quantity of radioactive substances disintegrates in the initial period after the blast, that is, during the first few hours after contamination. Therefore, the greatest degree of contamination will also be observed during this time. Gradually, the degree of contamination decreases progressively. Therefore, the more time has elapsed since the blast the less the danger presented by the contaminated territory.

Under conditions where atomic weapons have been used, particularly those with an explosive effect, there may be mass destruction and damage to shelters and cover, and part of the population may be left out of the shelters. In these cases the population should immediately leave the contaminated area. In order to leave the contaminated area as quickly and safely as possible it is essential to select correctly the direction and route of movement.

If the small and large MPVO units have developed their operations in the contaminated area the population can travel along the passages made and can be guided by the signs and instructions of MPVO stations for leaving the contaminated area. If the small MPVO units have not managed to designate the passages and exits, the direction of movement should be chosen independently.

In leaving an area exposed to an atomic explosion one should proceed in the direction where there is least destruction. One should go in the middle of the streets, remaining at a distance from the damaged buildings, because they may collapse. In all cases the direction of movement should be from the center of the explosion to the outer boundaries of the affected area, because the degree of contamination decreases considerably as the distance from the center of the blast increases. However, if the people are on the leeward side of the center of the blast it is sometimes dangerous for them to move along the direction toward the outer boundaries of the area of contamination, because they can come into the area of contamination in the wake of the radioactive cloud. In this case they should go in a direction perpendicular to the direction of the wind (across).

If only military radioactive agents have been used the direction of exit should be to the windward side (Fig. 7).

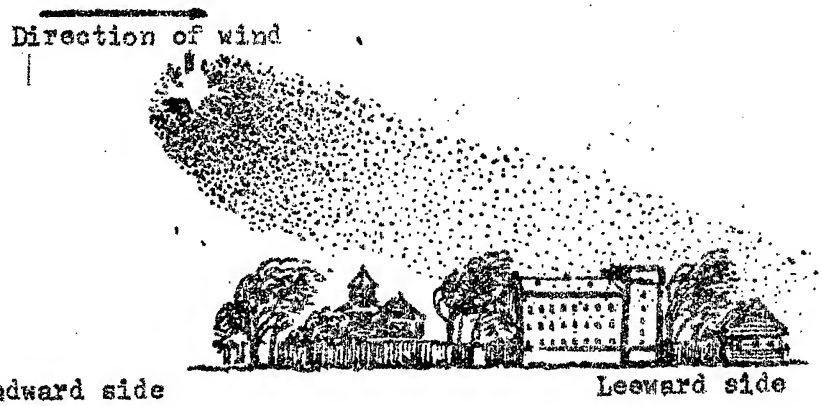

Fig. 7. Cloud of Air Contaminated with BRV being Moved by the Wind.

During the movement it should be kept in mind that radioactive substances and dust raised from the ground by the wind and the feet of passing people or by machine wheels settle on people passing through the area of contamination. If the people have protective cloaks or some other protective facilities on, the main mass of dust and radioactive substance stays on them. However the radioactive substances and dust can penetrate under the

protective facilities and come in contact with the skin and the ordinary clothing and underwear. In the absence of protective facilities all of the dust will settle on the ordinary clothes and on exposed skin.

In order to reduce the quantity of radioactive substance and dust which inevitably fall on the clothes and footwear of people passing through a contaminated area, precautionary measures should be observed which were indicated above.

What Should be Done after Leaving the Area of Contamination?

When people travel through a contaminated locality a contamination of their clothes and exposed parts of the body always occurs. Frequently, this dust on the clothes and skin even goes unnoticed.

Contaminated clothing presents a danger to man, because the radioactive substances on it expose him to external irradiation. After the gas mask or other protective facilities for the respiratory organs are removed the radioactive substances may be carried from the clothes to the mouth, nose, and enter the body. An even greater danger is presented by the radioactive substances which settle on the exposed parts of the skin.

Therefore, the radioactive substances which fall on the skin, clothes, footwear should be removed in the shortest possible time after leaving the area of contamination. Removal of the radioactive substances from the clothing, underwear and footwear is called "deactivation", while the removal of it from the skin is called "sanitary processing". Deactivation and sanitary processing can be accomplished in full volume (complete deactivation and sanitary processing) or can be carried out partly (partial deactivation and sanitary processing).

What is the sequence of operation after leaving the area of contamination, and how should deactivation and sanitary processing be accomplished?

The MPVO organs organize control-distributing points in the vicinity of the boundaries of the area of contamination, on the uncontaminated territory. All persons leaving the area of radioactive contamination should be sent to these stations, where they undergo dosimetric checking, that is, by means of dosimetric instruments at these stations the presence and degree of radioactive contamination of the clothes, footwear and underwear and of the person himself are determined.

If it is found that the degree of contamination is greater the permissible level (that is, the person may sustain an injury) the MPVO stations send the people to specially separated platforms, where the population carries out an independent partial deactivation and sanitary processing. In these cases the population performs the deactivation and sanitary processing under the supervision of the personnel of the MPVO stations. There may also be a situation wherein the platforms have not been organized yet. In all cases, in carrying

partial deactivation and sanitary processing it is essential to adhere to the following sequence of operations.

In an area set apart for the deactivation or at any other spot the cloak, raincoat or overcoat or other outer clothing should first be removed cautiously; it should be deactivated by means of shaking it out or striking it with a stick. In doing this, one should stand with his back to the wind so that in shaking out or hitting the garment the dust is not carried by the wind onto the person himself or his neighbors (Fig. 8). Deactivation of any outer clothes is performed in this way if no other protective facilities have been put on. If protective facilities were put on above the outer clothes, they are deactivated by dusting and cleaning by means of brooms, brushes, whisks of hay or straw, etc. In cleaning, the movements should be directed from above down. Then, the footwear is deactivated by wiping it or washing it, first cleaning the mud from it with a broom or brush (Fig. 9).

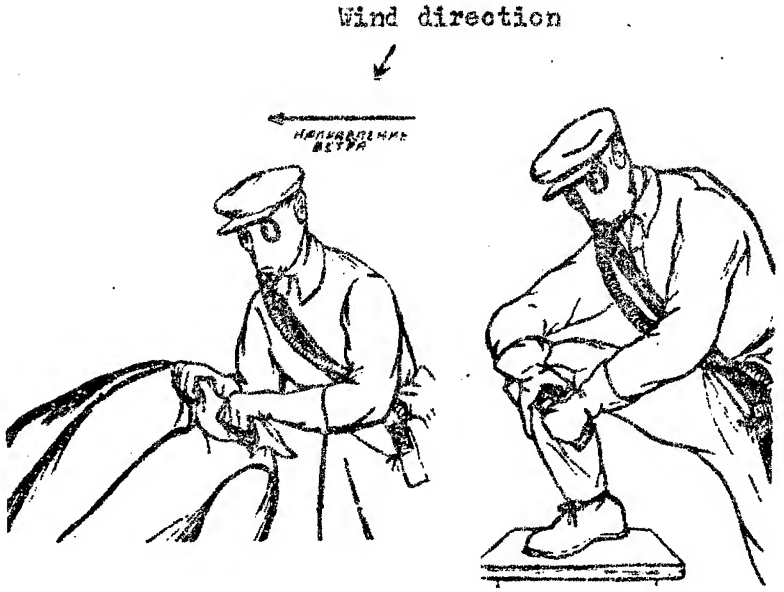

Fig. 8. Shaking out Cloak and Outer Clothes.

Fig. 9. Deactivation of Protective Stockings.

With the aid of the methods described above for deactivation the reduction of the degree of radioactive contamination of clothes, footwear, etc. by 90 percent or more is possible in the event of contamination of them with radioactive dust.

The deactivation of clothes and footwear should be accomplished of necessity with the gas mask or cotton-gauze mask on and in gloves. After the completion of the deactivation the gas mask is removed and

carefully deactivated. The cotton-gauze masks are destroyed rather than deactivated, because it is very difficult to remove the radioactive dust from them. Finally, the gloves are removed. This completes the deactivation and the partial sanitary processing is begun.

Partial sanitary processing consisting of washing the face and exposed areas of the body with uncontaminated water (better with soap) or liquid from the gas casualty first aid kit. In an extreme case wiping with a wet towel, handkerchief, gauze tampons or cotton tampons is used (Fig. 10). First, the hands are washed carefully with soap, directing attention to cleanliness of the nails. The face can be washed only with clean hands, taking care thereby that the mud washed from the face does not enter the mouth, nose or eyes. Then, the neck and other parts of the body are washed which had been exposed. The mouth and throat are rinsed with water.

However, the partial deactivation and sanitary processing performed in this way still do not completely guarantee the removal of all radioactive substances. Part of them may remain on the clothe footwear or skin. Therefore, after carrying out the partial deactivation and sanitary processing all citizens should undergo a dosimetric check, which should determine how completely the partial deactivation and sanitary processing were performed.

Fig. 10. Wiping the Face in Partial Sanitary Processing with a Wet Towel.

If it is determined as a result of dosimetric checking that despite the partial deactivation and sanitary processing performed some citizens still have a radioactive contamination of the body and clothing above the permissible standard, they are sent for complete

sanitary processing to the fixed wash stations, specially outfitted bath-houses, etc, where special MPVO commands perform a deactivation of the clothing, footwear and underwear of the persons involved. Complete sanitary processing consists of washing the entire body with water and soap.

Characteristics of Behavior in an Area Contaminated with War Gases

What is a Chemical Weapon?

War gases as well as all the facilities by means of which they are used are included in the concept of "chemical weapon": chemical bombs, chemical artillery shells, etc. Those chemical agents which when used for military purposes can produce intoxication of people and animals are called "war gases".

As a result of the use of chemical weapons by an enemy the air, city territory or territory of an inhabited place, transportation, equipment and various objects on the given territory may be contaminated by war gases.

Until they are used in battle all war gases are in the liquid or solid state in military containers: chemical bombs, artillery shells, etc. When the body of the casing breaks the war gases are converted into their military state--vapor, gas, fog, smoke or even droplet states, thereby contaminating the air and the locality.

If such readily volatile war gases as phosgene, diphosgene, chlorcyan, hydrogen cyanide have been used as the material for charging the bomb, when the bomb or shell casing breaks they evaporate and mix with the air in the vapor state (or gas), contaminating it. Some war gases can be broken up into very fine solid particles on explosion of the bomb, which remain in the air in the suspended state for a long time, forming poisonous smokes. Among such war gases are chloracetophenone, adamsite and others.

A characteristic feature of these war gases is the fact that they contaminate chiefly the air, as a result of which people may be affected not only at the site of explosion of the bomb but also at a considerable distance from it, because the cloud of contaminated air is carried by the wind. The distance to which the cloud of contaminated air can be moved depends on the meteorological conditions. The relief of the terrain, the planning of the streets, the pointed nature and height of buildings, etc. also have an influence on the depth of penetration of the cloud. For example, in a city with broad and straight streets, on a gloomy day, in the presence of a slight wind as well as at night the depth of penetration of the contaminated cloud reaches several kilometers.

War gases which contaminate the air can involve the people en masse as well as animals, because the contaminated air penetrates freely into buildings, structures, construction as well as into the

shelters which do not have any special equipment (filtered air conditioning and hermetic sealing) for protection against war gases.

In the summer time, particularly on hot days or in the presence of a strong or gusty wind, these war gases can preserve their traumatic properties 40-60 minutes. During the cold part of the year this time is lengthened to several hours, but no more than a day. Therefore, they are customarily called nonpersistent war gases.

In some cases, however, the cloud of contaminated air can remain for a long time--several hours and days, maintaining its injurious properties. Places of air stasis in cities are narrow streets, blind alleys, yard wells, parks, boulevards, etc.(Fig. 11). In a rural locality the contaminated air will stagnate in gullies, hollows, bushes, woods, etc. (Fig. 12). The contaminated air can also leak into the non-sealed and poorly ventilated rooms and cellars.

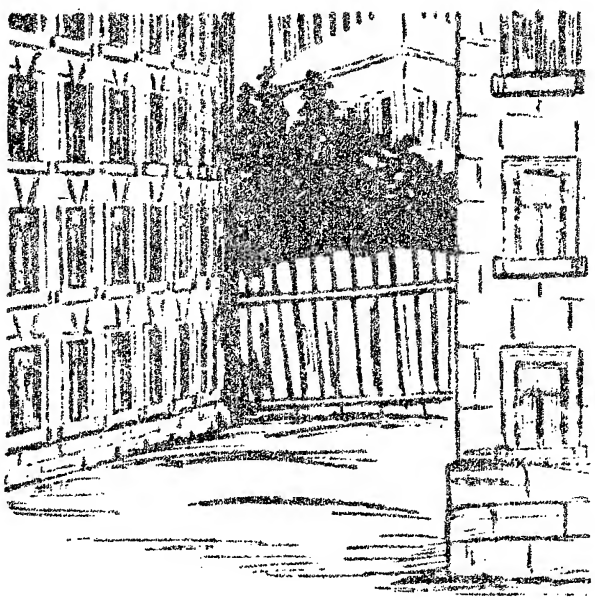

Fig. 11. Place of Stagnation of Cloud of Contaminated Air (Blind Alley).

Some war gases (for example, mustard gas, lewisite, nitrogen mustard and war gases of the sarine type) are ejected from the body of the bomb after it ruptures in the form of droplets and spray, contaminating the soil, buildings, structures, various objects, water, food products, etc. They remain in the droplet state in the locality and on all objects, preserving their injurious properties for a long time. In the summer this time reaches several hours, but in the winter their injurious effect lasts for days and even weeks. Therefore, they are customarily called persistent war gases.

Fig. 12. Site of Stagnation of Cloud of Contaminated Air (Gully).

The persistent war gases also produce contamination of the air, because they are evaporating continuously, and a cloud of air is formed over the contaminated locality which is contaminated with their vapors. The behavior and persistence of this cloud subsequently depends on the conditions mentioned above. Vapors of these war gases can produce, particularly during the warm part of the year, serious injury to people and animals in the area of contamination and outside it (on the leeward side).

The persistent war gases rapidly impregnate the soil, wood, fabric, hay and other porous material, contaminating them to a considerable depth and increasing the time of their action.

Therefore, people and animals in the area of contamination with persistent war gases can be intoxicated through the direct contact with contaminated soil, transportation, equipment and various objects, as well as through the inhalation of contaminated air.

The duration of the contamination and the power of the war gases of preserving their injurious properties (that is, the persistence of the war gases) is different in the case of all war gases and depends not only on the physicochemical properties of the war gas itself but also on the methods of application, meteorological conditions and other factors.

The greater the wind velocity and the higher the air temperature the less the persistence, because thereby the evaporation of the war gas and the dissemination of its vapors occurs much more rapidly than in the case of a mild wind and low temperature. Precipitation (rain, snow) markedly decreases the degree of contamination of the air, because when it falls to the ground it takes the war

gases out of the air. A heavy rain washes the war gases out of a contaminated surface, and snow serves as a protective layer, stopping the effect of the war gas on people and animals. In an open locality, broad streets well ventilated by the wind, and on the sunny side of the street the persistence of war gases is always less.

As is seen, the war gas may be preserved in the area of contamination for a longer or shorter time depending on the factors listed.

Why are War Gases Dangerous?

The injurious properties of the war gases are very heterogeneous. Some of them cause a temporary irritation of the eyes, nasopharynx or upper respiratory tract which is not dangerous; others, serious diseases, which can cause the death of the afflicted persons. As a rule, the majority of war gases possess varied effects, but there are also those war gases which affect only certain organs, like, for example, phosgene, which produces pulmonary involvement.

Such war gases as mustard gas, lewisite and others, which are used in the droplet state, can come into direct contact with the skin or clothes, underwear and footwear and produce serious skin lesions and general intoxication. The intoxication may occur from the inhalation of contaminated air as well as through the entrance of the war gas into the body along with contaminated water or food products.

The larger the quantity of war gases which comes into contact with the skin or enters the body by one route or another and the longer the contaminated air or droplet war gas acts on the person the greater will be the degree of injury produced.

Protective Facilities against War Gases

When one is in a locality contaminated with war gases, one should first provide protection for the respiratory organs, because involvement of them is particularly dangerous. For the purpose of protecting the respiratory organs against war gases only the gas mask is used. No other facilities--respirators, cotton-gauze masks, etc.--offer protection against war gases.

If an enemy is using persistent war gases, the skin should be protected, for which purpose the population will mainly use some of the types of ordinary clothing--for example, impermeable overcoats, raincoats, mantles. Protection of the skin is particularly essential in those cases where the person does not travel along a passage made but rather directly through the contaminated territory. In this case the main attention should be directed toward protection of the feet.

For this purpose ordinary rubber boots, rubbers and other rubber footwear may be used. However, it should not be forgotten that certain war gases--for example, mustard gas and lewisite--possess the power of penetrating through rubber, as a result of which

injury may occur. The smaller the layer of rubber the more rapidly these war gases can penetrate through it. Ordinary footwear, which has a rubber layer of slight thickness, provides protection for the feet for a short period of time.

If there is no rubber footwear available, the feet should be wound around (especially over shoes or slippers) with rags, heavy paper; in an extreme case, wooden boards should be attached to the soles, and an attempt should be made as soon as possible to leave the area of contamination.

While an overcoat, raincoat or cloak made of rubberized fabric polyethylene and chlorvinyl films offer comparatively good protection against liquid droplet war gases, none of these types of clothing protect completely against war gas vapors, because their arrangement does not provide the necessary sealing.

In this case the main protective measure is maximum reduction of time spent in the area of contamination.

Actions of the Population in an Area Contaminated by War Gas

The population puts on the gas mask and other protective facilities at the "Chemical Attack" signal. In a number of cases the population has to put on protective facilities before the signal is given, independently. Taking into consideration the fact that war gases such as sarine and others are rapid-acting and can cause a fatal injury as the result of the inhalation of air contaminated with them in a short time, the population should know the external signs of application of a chemical weapon by an enemy in order to put on the protective facilities independently, without waiting for the signals.

The use of war gas may be determined by the faint muffled sound of explosion of a chemical bomb; a small cloud appears over the site of the explosion which rapidly disseminates. When war gases are sprayed from airplane spray tanks rapidly disappearing dark or gray streaks may be seen behind the airplane. With the explosion of a chemical penetration-effect bomb a small crater is formed in which the residues of the bomb casing remain. Drops of liquid war gases are seen in the crater and around it (in the event of use of war gases of the mustard gas, lewisite or sarine type). With the increase in the distance from the crater the number of drops decreases notably (Fig. 13). The area of contamination acquires the shape of an irregular circle, extended in the direction of the wind. Drops of the war gas can be seen well on asphalt, walls of houses, leaves of plants and on surfaces of various objects. The viscid war gases may shown as blotches, smears and irregularly shaped droplets.

Leaves of trees, bushes and grass acquire a yellow or reddish hue and shrivel up under the influence of some war gases (mustard gas and lewisite). During the first few hours after the

contamination on the surface of water bodies (particularly with stagnant water) an oily iridescent film is seen.

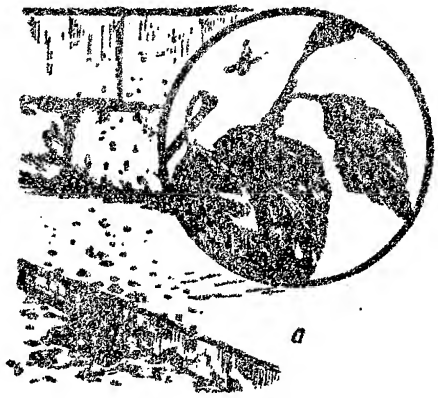

Fig. 13. Signs of Use of War Gases:

a--remains of casing of chemical bomb; b--drops of war gas on leaves

Finally, the presence of some war gases in the air can be determined by the odor characteristic of them. Thus, for example, the odor of mustard gas resembles the odor of mustard; that of lewisite, the odor of geranium leaves; hydrogen cyanide and chlorcyan have the odor of bitter almonds or cherry pits, and phosgene and diphosgene have the odor of ripe hay or decaying fruit. However, the use of this method for detecting or determination of war gases is not only unreliable; it is very dangerous, because some war gases, for example, of the sarine type, have practically no odor. If a person smells the characteristic odor of a war gas he should immediately put on a gas mask and other protective facilities.

In a number of cases the presence of war gas in the air may be determined by the signs of injury which have already appeared.

Thus, the vapors of the war gases of the sarine type which are in the air, even in the lowest concentrations, immediately cause a loss of visual acuity to such a degree that in twilight a person cannot see at all. Afterwards, the person has a feeling of weight in the chest, difficulty in respiration. These signs of injury consitute a warning that vapors of a war gas ofthe sarine type are in the air.

On the inhalation of vapors of hydrogen cyanide and chlorcyan a metallic taste appears in the mouth, irritation of the upper respiratory tract, headache, weakness and mild nausea. The vapors of chlorcyan, in addition, cause an irritation of the mucous membranes of the eyes. With the appearance of these signs it is necessary to put on a gas mask immediately.

The effect of phosgene and diphosgene vapors produces a sweetish taste in the mouth, a cough and dizziness. However, these

signs disappear after several minutes, and the person feels normal, because these war gases possess a period of latent effect. In such cases, putting on the gas mask is necessary even if the first signs of injury have disappeared, and the feeling of well-being has improved.

After the inhalation of lewisite vapors a person develops dryness in the throat, coryza, cough, hoarseness and pains in the chest. Because of the fact that the vapors of mustard gas and nitrogen mustard possess a quite long latent effect period these signs of injury appear some time after the time of injury, sometimes several hours later, which makes these war gases especially dangerous.

Lacrimatories--chloracetophenone and brombenzylcyanide--are detected comparatively easily by their characteristic pleasant flower odor and the irritating effect on the eyes, as a result of which lacrimation, cutting pain in the eyes, involuntary tight closure of the lids occur immediately. The group of irritant war gases--adamsite and diphenylchlorarsine--practically have no odor but exert a rapid effect on the upper respiratory passages. The signs of injury by these war gases are cough, sneezing, burning and pain in the chest, sometimes even vomiting.

The first protective measure against all lacrimatory and irritant war gases is also the donning of a gas mask. Because the pathological phenomena from adamsite or diphenylchlorarsine involvement may be perceived even after the gas mask has been put on, the gas mask should not be taken off in any case, and in case of vomiting the mask of the gas mask should be drawn forward.

If an individual gas casualty first aid kit is available the ampoule with the antismoke mixture should be taken out, crushed, and put in under the mask of the gas mask along with the gauze sac in which it comes. After the inhalation of the vapors of this mixture the irritation of the upper respiratory tract rapidly lessens, and after several minutes it disappears entirely.

All protective measures should be taken immediately in the case of occurrence of any of the first signs of injury. Delay may lead to serious intoxication and even death.

In all cases, people should leave the contaminated area as soon as possible and come out into a safe place; they should reduce the time of action of the contaminated air, should move only to the windward side (opposite the wind) or in a direction perpendicular the the direction of the wind.

If persistent war gases have been used, special attention should be directed to the route of movement: drops, grease spots and puddles should be avoided, as should also contact with vegetation. When drops or smears of these war gases come in contact with the skin or clothing they should be removed cautiously by means of tampons made of rag, oakum, hay or paper, trying not to smear it and not to carry them onto other areas of skin. The contaminated places are then degassed with fluid from the individual

gas casualty first aid kit (Fig. 14). If there is no kit available anything that is at hand may be used: kerosene, benzine, alcohol or any other solvents, by means of which the drops or ointments of war gas coming into contact with the skin or clothes may be removed. In an extreme case one may have to be limited to removing them with tampons only. The larger the quantity of war gas removed from the skin and clothes the less will be the degree of injury.

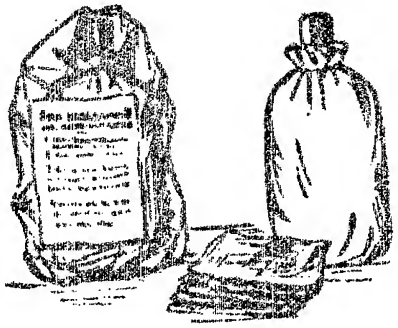

Fig. 14. Individual Gas Casualty First Aid Kit with One Flask

Time the war gas acts on the skin also influences the degree of injury. Because of the fact that the persistent war gases penetrate rapidly through the fabric of the clothes (aside from cotton and fur) and underwear and just as rapidly impregnate the skin the drops or ointments of war gas should be removed as soon as they are noticed. If the war gas drops are removed during the first 10-15 minutes after they come into contact with the skin and the affected areas are treated, the skin injury may be avoided altogether. This does not mean that after the lapse of this period any treatment is useless. If the processing is performed later, even though injury to the skin is possible the degree of it is reduced. In addition, unremoved drops or ointments of war gas can be mechanically transferred to other areas of the skin or clothes or to the face, in the eyes, etc., thereby increasing the extent and degree of injury.

What Should be Done after Leaving the Contaminated Area?

After leaving the contaminated area the population should independently perform the partial sanitary processing and degassing of clothes and footwear.

First the mantle is cautiously removed (or overcoat, raincoat or other protective facilities), as are also the stockings; here one is particularly careful to see that the outer surface of the

protective facilities does not come into contact with the skin or clothing. Then, the clothing, footwear and exposed parts of the body is examined, and any drops or war gas ointments found there are removed (if they were not removed immediately after they came there), using tampons made of cotton, rags, grass, paper, etc. for this. Then, those places from which the war gases were removed are treated by means of the individual gas casualty first aid kit (Fig. 15), or else kerosene, benzine, eau de cologne or other solvents are used for the processing. If the war gases have penetrated through the fabric, without removing the clothes or underwear those places on which the liquid droplet war gases have fallen are copiously smeared with the fluid from the gas casualty first aid kit until the fabric is wet through and the skin feels the moisture.

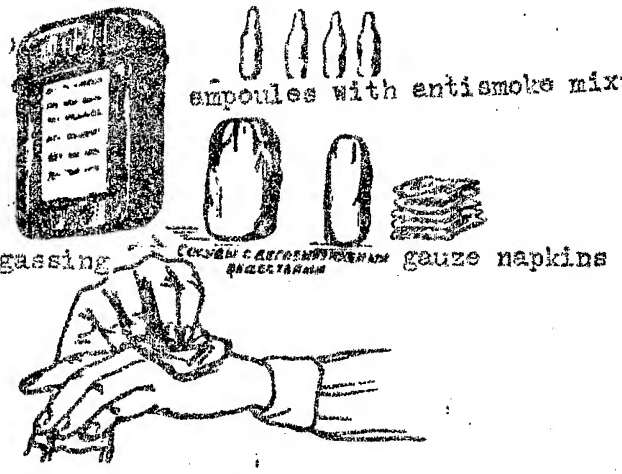

Fig. 15. Individual Gas Casualty First Aid Kit with Two Flasks.

If no protective stockings were worn the footwear is treated, including the rubber footwear, just as described above.

Only after this can the gloves and gas mask be removed. The hands and exposed parts of the body are carefully treated with fluid from the kit. In treating the head and face care should be taken to see that the fluid does not enter the eyes. The eyes are irrigated with a weak solution of sodium bicarbonate or with uncontaminated water; the nose and throat are rinsed.

In the case of skin lesions or severe contamination of the clothing the patients are sent to fixed washing stations, where they are subjected to complete sanitary processing, and their clothes underwear and footwear are degassed (that is, decontaminated).

People coming from the contaminated areas with signs of general intoxication, eye involvement or involvement of the respiratory organs are immediately sent to therapeutic institutions.

Characteristics of Bacteriological Contamination

What is Bacteriological Contamination?

The basis of the injurious effect of the bacteriological weapon is constituted by bacterial agents--pathogenic microbes and toxins. They are designed for the intentional infection of people and farm animals with various infectious (contagious) diseases. For the purpose of affecting the crops and woods insects may also be used--pests of plants and woods--as may also some chemical agents.

Pathogenic microbes used by the enemy as bacterial agents are the pathogens of many infectious diseases: for example, plague, tularemia, typhus, cholera and others. They are very small living beings, usually unicellular, visible only by means of the microscope. In the course of their activity some pathogenic microbes are capable of producing poisons--toxins which are capable of causing serious intoxications. Among them are botulinus toxin, which may be used as a bacteriological weapon, as well as toxins of the pathogens of tetanus, diphtheria and others.

The bacterial agents may be used by different methods.

One of the principal methods is the use of pathogenic microbes and toxins in the form of dry and liquid recipes. When they are sprayed into the air a bacterial cloud is formed which consists of very small solid or liquid particles of the recipe used, which is in the air in the suspended state. Thus, bacterial smokes or fogs are obtained which are called "aerosols".

Like the cloud with war gases the bacterial cloud is moved by the wind and can affect people and animals at a considerable distance from the site of its formation. Just as in the case of the war gas cloud, the bacterial cloud can linger in narrow streets, blind alleys, yard wells of many-story buildings, parks, boulevards, gullies, etc. In this case the infection of people and animals occurs chiefly as a result of the inhalation of air contaminated with the pathogens of some infectious diseases.

In addition, the particles with bacteria settling from the air (cloud) contaminate the soil, buildings, transportation, water, food products and various objects, which are in the given territory, thereby producing a contamination of the locality. The bacterial particles settling on the surface of the soil, buildings, etc. can be carried up into the air again by the wind, and also because of the movement of transportation or people. In this case, the infection of people and animals is possible not only through the inhalation of the contaminated air but also as the result of the direct contact with infected water, buildings and various objects.

For the purpose of producing bacterial aerosols in air bombs of various designs may be used, as can also guided missiles. The spraying of bacterial recipes into the air can be accomplished also by means of airplane spray tanks or some other spraying devices set

up on the airplane.

Another method of using the bacterial agents is the use of contaminated insects, ticks and animals (chiefly rodents), which are both the vectors of the pathogens of many infectious diseases (for example, plague, typhus, tularemia, encephalitides and others) and the sources of infections.

This method is based on the fact that the majority of insects and ticks, being infected, possess the ability of transmitting the pathogens to healthy people.

If vectors were used for the bacteriological attack the creation of a long-standing stable focus of infection may be expected, because some insects (for example, fleas) remain infected throughout their lives, while ticks also transmit the pathogens to their offspring. In addition, the insects extend the focus of infection considerably, because many of them (for example, diptera) are capable of flying considerable distances, up to several kilometers, and ticks may be carried by animals and birds on which they live and feed. Mice, rats and other rodents travel quite large distances, considerably extending the boundaries of the areas of infection.

Specially designed containers, bombs, etc.can be used for dropping the infected vectors.

The possibility of distributing the pathogens by means of various carriers, for example, infected feathers, leaves, food products, articles of clothing, etc. has not been eliminated.

Finally, the use of bacterial agents is possible by means of diversions. By this method water bodies, pastures, crops, stores of food and fodder, etc. may be infected.

Characteristics of the Injurious Effect of Bacterial Agents

Bacterial agents, in contrast to other types of weapons including mass attack weapons, possess certain characteristics which, intheir turn, are determined by the nature of the pathogenic microbes and the toxins used as bacterial agents.

The bacterial agents can produce diseases of people and animals even if a negligibly small number of pathogens enters the body. Thus, for example, in order that a man become sick with plague it is sufficient for a total of several plague organisms to enter the body.

While those affected by war gases or radioactive agents during the initial period of involvement and subsequent course of the sickness do not represent a danger to those around, patients with infectious diseases are extremely dangerous in the majority of cases. Therefore, infectious diseases arising as the result of a bacteriological attack can subsequently spread rapidly among people and animals, considerably extending the boundaries of the area of infection. Plague, cholera, natural smallpox spread with particular rapidity, because of which they are categorized among the particularly

dangerous infections.

The fact that a certain period of time, called the "incubation period", elapses between the time of infection and the occurrence of the first signs of disease as a rule contributes to the rapid spread of infectious diseases also. This period differs depending on the disease and can vary from several hours to several days and even weeks. During the entire incubation period the people who are infected feel healthy, even though in some cases they are already dangerous from the viewpoint of spread of the infection.

The complexity and difficulty of diagnosis of disease when an enemy has used bacterial agents can create an impossibility of early detection of sick people and animals and of their timely isolation from those around, which will contribute to the spread of the infectious diseases. Timely detection of the patients can be complicated, in addition, by the use of pathogens of those diseases which have not been encountered previously in the given locality.

Among the characteristics of the bacterial agents is the difficulty of detection of pathogenic microbes and toxins in the environment, because they do not have any color or odor and are invisible to the naked eye. The detection of them and the determination of the type of pathogens used and of the toxins is possible only by means of laboratory examinations requiring quite a long period of time.

Protective Facilities against Bacterial Agents

In order to protect the respiratory organs and prevent the entrance of pathogenic microbes and toxins into the body gas masks are used, and if they are not available, protective masks, respirators, cotton-gauze masks. For the purpose of protecting the eyes dust goggles are used. Pieces of gauze, fabric or a towel folded several times provide quite good protection. In order to keep the contaminated air from penetrating into the respiratory organs through the slit formed betweenthe cheeks, alae of the nose and the dressing, both sides of the nose should be stopped up with clumps of cotton. A mask put on in this way or even a simple dressing offers reliable protection to the respiratory organs against the penetration of pathogenic microbes and toxins.

The exposed parts of the body should be carefully protected also against the entrance of bacterial agents into them, because pathogenic microbes and toxins penetrate into the body even through skin injuries, sometimes completely unnoticeably. All the handy measures, such, for example, as articles of ordinary clothing (overcoat, raincoat, mantles, rubbers, boots, etc.), ski suits, cotton overalls, gowns, etc. can serve as a reliable protection of the skin, because the pathogenic mirobes and toxins do not penetrate through the fabric of clothes, underwear or footwear, regardless of the time of their action. However, they can be brought to the mouth, nose, eyes, or skin from the hands, hair, infected clothes, underwear, etc

Among the protective measures which have application only to conditions of bacteriological attack are all-possible insect repellents. The clothes, face, arms and exposed parts of the body (care should be taken that it does not enter the eyes) is smeared with these agents, protective nets are impregnated (worn on the headgear for protection of the face, head and neck) and netted oversleeves.

Rules of Behavior in an Area of Bacteriological Contamination

All the properties of bacterial agents described above make them particularly dangerous. The main danger consists also in the fact that infection of people can occur not only as the result of their being in the infected locality but also through direct contact with sick people and animals, sometimes even beyond the limits of the area of direct application of the bacterial agents.

Therefore, all persons who are within the limits of the boundaries of the area of infection are considered involved, including those who have used contaminated food and water or those suspected of contamination.

In order to isolate the area of infection along with the people and animals on its territory and, by the same token, stop the further spread of the infectious diseases, the MPVO organs establish a quarantine in the area of infection.

The quarantine is introduced immediately after information is obtained concerning a bacteriological attack or else with the outbreak of disease among people or animals.

What measures are taken in the area of infection during the quarantine, and what are the duties of the population in this case?

Until the species of pathogen used has been determined the area of infection is surrounded by a special armed guard. Exit of people, bringing out animals or the exportation of any equipment from the area of infection is strictly forbidden. Entrance onto its territory is strictly limited. If it is determined that the pathogens of plague, cholera or smallpox have been used, a guard is organized for stores, water sources, the regulation of movement of transport, the maintenance of order in the entire territory of the area of infection, checking on the movement of the population, etc. are put in order through the personnel of the service for maintaining order and safety. Socialization between various population groups is limited or forbidden. Food supply and the provision of other articles necessary for life are accomplished directly on a house to house basis. Physicians and medical personnel make rounds of apartments, enterprises, institutions, etc. for the purpose of timely detection of the sick or those suspected of disease.

If it is determined that pathogens of smallpox, cholera or plague have not been used, the quarantine is replaced by observation.

During the course of the observation the exit of citizens from the area of infection is not forbidden but rather is limited. On leaving the areas of infection all civilians are subjected to inoculations against the disease in question, and a complete sanitary processing is accomplished with disinfection of underwear, clothes and footwear.

The observation is lifted a certain period after the recovery of the last patient. This period is usually equal to the incubation period of the disease which was detected in the area of infection. From the time of lifting of the observation all restrictions and special rules of behavior of the population, which were established during the period of observation, are lifted.

Regardless of what was declared in the area of contamination--quarantine or observation--all civilians on the territory of this area are given protective inoculations. The territory of the region, buildings, equipment, transportation, and all objects are subjected to disinfection. Disinfection operations are carried out by special large and small units of the MPVO.

The population accomplishes the disinfection of the houses and certain domestic objects.

In those areas where quarantine or observation has been introduced, the population should observe precautionary measures and personal hygiene with particular care: they should wash vegetables and fruit with boiled water; milk and water should be used only after boiling; care should be taken that the body, underwear are clean; the hands should be washed as often as possible, etc. Fly paper or flytraps should be kept for the destruction of flies, mosquitoes and other flying insects in the rooms and other premises, and the windows should be protected with screens or gauze netting. In order to prevent the appearance of fleas, lice and other insects, soft domestic objects (mattresses, pillows, beds, etc.) should be sprinkled with DDT preparations.

With the appearance of a large number of flies, roaches, mosquitoes, fleas and other insects as well as rodents this should be immediately reported to the nearest sanitary epidemiological station and the most decisive measures for their destruction should be taken.

With the first signs of onset of disease each civilian should immediately call the physician or turn into a medical institution. This not only will save his live and mitigate the course of the disease but will also interfere with further spread of the disease.

What signs indicate the onset of disease? A marked elevation of temperature, headaches, chill, general weakness and malaise, nausea and calls to vomiting, the appearance of diarrhea and others. As a rule, these signs do not appear simultaneously, because various signs are characteristic of each disease. However, under conditions of a bacteriological attack the appearance of even one of them should be considered suspicious.

Until the physician comes and the patient is sent to the hospital certain precautionary measures should be taken: the patient should be isolated in a separate room or his bed should be fenced off with a screen or sheets; utensils and toilet articles should be set apart for his use; nobody should leave the room and apartment house in which the patient is located, and nobody should be allowed in who does not live there; all the instructions of the physician and medical personnel should be carried out strictly.

Some part of/the population may, at the time of the bacteriological attack, be in a locality which is being subjected to the direct effect of the bacterial agents. For example, in the region of distribution of the bacterial cloud or in the vicinity of places where bacterial bombs, containers, packs, etc. fall containing infected insects or rodents (Fig. 16). In a number of cases the MPVO organs will not be able to determine the fact of a bacteriological attack immediately. In this matter the population can give tremendous aid to the MPVO organs, for which purpose all the civilians should know the signs that an enemy has used bacterial agents.

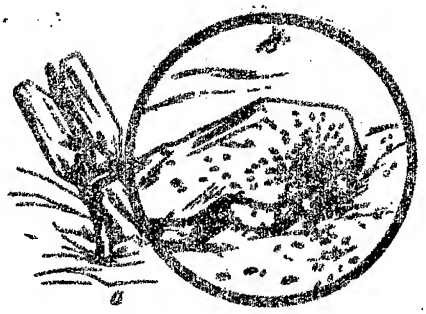

Fig. 16. Signs of a Bacteriological Attack:

a--remains of the bacterial bomb;
b--accumulation of insects.

The rupture of the bacterial bomb may sometimes remain unnoticed, because a characteristic of the effect of these bombs and other military devices is the muffled sound of their explosion. At the time of the explosion a small cloud of smoke or a fog, which is scattered by the wind, appears on the surface of the ground. In places where bombs have fallen large fragments and individual parts of the bombs may be found. In these cases, powdery and gel-form substances or drops of liquid may be found on the fragments, soild, walls and roofs of buildings, the leaves of trees and bushes, on grass, etc.

The presence of an accumulation of insects, ticks or rodents,

unusual for the given locality or time of the year, particularly at places where containers, packs, sacs, etc. have fallen, as well as the death of wild animals, rodents or birds also indicate the use of bacterial agents.

In those cases where the population witnesses a bacteriologic attack or someone finds some of the signs described above, they should immediately put on protective facilities and as soon as possible report what was found to the nearest MPVO headquarters, milita and medical workers. In case of the sudden death of domestic animals or the appearance of cases of disease among them en masse the sick animals should be separated from the healthy ones, and this should be reported immediately to veterinary workers.

If the MPVO organs define the boundaries of the focus of infection, people will leave it by being guided by indicators and warning signs. In the absence of signs the people should leave toward the windward.

In passing through a contaminated locality or in an area where there is a bacterial cloud a person may get pathogenic microbes and toxins on his footwear, clothes, underwear and protective facilities. Because the pathogenic microbes and toxins can be carried to the skin and mucosae of the eyes and nasopharynx, etc. from the contaminated clothes, footwear, underwear, hands or hair, the population should independently accomplish a partial sanitary processing and disinfection immediately after the attack with bacterial agents, thereby observing a certain order and caution. (The removal or disinfection of pathogenic microbes or toxins directly on the human body is called "sanitary processing"; the destruction of the pathogenic microbes and of the toxins which have fallen on the clothing, underwear and footwear is called "disinfection").

Partial sanitary processing and disinfection are begun with a cautious sweeping of the cloak or other protective facilities with a brush or broom, as well as of the stockings, and if they were not used, of the upper clothing and footwear; the gas mask bag is shaken out, and the cannister and face portion of the mask are wiped off with disinfectant solution. Then, without removing the gas mask, the cloak or outer clothes are carefully removed, carefully shaken out and again brushed off or cleaned with the brush or broom, after which they are put on. Hereby, one should stand with his back to the wind and carefully see that the exposed parts of the body do not come into contact with the outer surface of the clothes; and during the shaking out and cleaning, that no dust fall on the person himself or on other people.

Only after this can the gloves and gas mask be removed, the hands and exposed parts of the body be washed out with some disinfectant solution, for example, two-percent chloramine solution in water or the liquid from the individual gas casualty first aid kit.

Regardless of the performance of partial sanitary processing and disinfection as well as of the protective facilities used, the entire population within the limits of the area of bacteriological contamination must, of necessity, undergo a complete sanitary processing with disinfection of the clothing, underwear and footwear at special wash stations, sanitary processing rooms or in bathhouses specially outfitted for this purpose.

For complete sanitary processing the exposed parts of the body are treated with disinfectant solutions, and the entire body surface is washed with hot water and soap.

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The rules of behavior of the population in contaminated areas analyzed do not exhaust all the cases which may be encountered under actual conditions.

Along with cases of infection of the territory with radioactive agents or war gases or bacterial agents combined contamination is possible. The territory may be contaminated simultaneously with any two of these injurious agents. The possibility has not been excluded of infection of the territory simultaneously with radioactive and bacterial agents and war gases.

The situation of the population in areas of combined contamination is complicated. In these cases the injurious properties of the agents with which the territory is contaminated should be taken into consideration, and all the rules of behavior should be observed with particular precision and strictness.

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